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DIVISION ACTIVITIES IN RELATION TO BORROWERS

U. S. DEPARTMENT OF AGRICULTURE
RURAL ELECTRIFICATION ADMINISTRATION

TECHNICAL STANDARDS DIVISION

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Activity 1

I. Consulting Service.

II. Details of Activity.

- A. The nature and scope of this activity are to serve as consultant to other Divisions of RRA, and to other Bureaus of the Department of Agriculture, and to other Agencies of the Government, when assigned.
 - B. This activity is carried on by all sections of the Division.
 - C. This is one of the basic functions of the Division. The Division is regarded as a consulting body on many technical problems for RRA or other Divisions in RRA.
 - D. Each problem or job presented to the Division is different, and the method used in obtaining a solution is likewise different. However, the main objective, that of obtaining an answer, has remained the same.
 - E. Changes occur as the need for them arise in doing an assigned job. This requires a flexible organization which can meet these variable conditions.
 - F. As a general rule, this function applies to all three categories.
 - G. Accomplishments of this consulting service have been innumerable.
- III. This activity should be continued as one of the main functions of the Division.
- IV. There are many activities which result from carrying on consulting service. Many jobs require establishment of an entirely new activity in order to obtain a solution of the problem.

Activity 2

I. Preparation of Technical Reports.

II. Details of Activity.

- A. The nature and scope of this activity are the preparation and writing of technical reports as may be required of the Division.
 - B. This activity is carried on by all sections of the Division.
 - C. Whenever important studies are made that would be of benefit to REA or others, the necessary reports indicating the results of the studies were made.
 - D. The general objective of this activity has not changed since it was originally established.
 - E. Whatever changes that have taken place are usually in regard to the method of studying and preparing different reports on various subjects.
 - F. The majority of reports prepared, applies to all three categories.
 - G. Many technical reports have been prepared by the Division which are valuable to engineers both in and outside of REA.
- III. This activity should be continued since it is an essential feature of almost every activity carried on by the Division.
- IV. This activity is as a rule complete in itself and is continuous as long as technical studies are carried on by the Division.

Activity 3

I. Supervision of the Review of Available Equipment and Stimulating the Development of New Equipment.

II. Details of Activity.

- A. The nature of this activity is to supervise the review of available equipment, such as transformers, conductors, hardware, protective devices, poles, and the like, with reference to its conformance with IEC requirements, and to stimulate equipment manufacturers and established research centers in the development of better equipment. The scope includes the detailed study of each item of material and equipment used on RCM systems to determine whether they comply with specifications and the service conditions and are the best obtainable.
- B. This function is performed by the Specifications and Drafting and the Equipment Standards and Performance Units together with the Technical Standards Committees and the assistance of the other units of the Technical Standards Division.
- C. See "A" above.
- D. No changes except more detailed study of supply and field conditions.
- E. Changes made as a result of experience include the creation of the Technical Standards Committees to pass on all items after careful consideration and attempts to obtain more information on actual field conditions in regard to sleet, snow, ground resistance, vibration, lightning and other service characteristics.
- F. Generally applies to all cooperatives but special field conditions cause wide variations.
- G. Accomplishments have been numerous and have resulted in improved service through changes in specifications as recorded by Technical Standards Committee minutes and noted in monthly progress reports.
- III. This work should be continued and expanded as much as possible to provide more suitable items for rural systems which will be designed for the special conditions of service and reliability. Actual results are somewhat curtailed at present, but manufacturers are requesting our recommendations for improved or added items which will be required.
- IV. The development of the necessary background of experience would be considerably accelerated if more field information were available.

Activity 4

I. Consultant to Various National Defense Agencies.

II. Details of Activity.

- A. The nature and scope of this activity are to serve as consultant to various National Defense Agencies, for such purposes as, for example, the appraisal of existing electrical facilities in defense areas, and the preparation of coordinated standard generation, transmission and distribution facilities for Army camps and other defense projects. This includes the furnishing of such information and assistance as requested by defense agencies, which may include surveys, estimation, consulting services or complete designs and specifications.
- B. Information supplied by the Distribution Systems Section of the Technical Standards Division.
- C. Started at request of the Army for such assistance.
- D. No changes.
- E. No changes.
- F. Does not apply.
- G. Information has been furnished as requested but drawings and specifications are in preliminary form only.

III. Activity should be continued to complete the drawings and specifications for presentation to the Technical Standards Committee since they are now being used for acquisitions even though very incomplete and not approved. A standard program for rehabilitation would require this.

IV. A standard form of procedure would seem to be desirable for making appraisals of all acquisitions.

Activity 5

I. Review of Existing or Proposed Divisions from established by IEC 60061-1

III. Details of Activity.

- A. The nature and scope of this activity involved are the review of all existing or proposed standards in use on cooperatives' new lines or acquisitions to determine what changes should be made to improve service and reduce cost.
- B. This activity is carried on by the Specifications and Drafting Unit of the Distribution Systems Section.
- C. This activity was created to provide a type of construction or reconstruction which would be as near standard as possible consistent with low cost and satisfactory operation.
- D. The changes made have been only in quantity due to more acquisition and the receipt of field experience.
- E. Changes made have been to provide better service, as for instance the provision of greater conductor spacing and impulse insulation to avoid contacts and lightning trouble on all pole top assemblies. Many other similar ones might be mentioned.
- F. Activity is of benefit to all cooperatives.
- G. The use of standard construction and equipment provides for a minimum cost of construction and operation with maximum safety for operating personnel and public.
- III. The activity should be continued and expanded to avoid further mistakes and to correct present unsatisfactory conductor spacing and similar operating troubles which are easier to correct at the start than later.
- IV. Close & Field contact would be desirable to accomplish the expected results.

Activity 6

I. Preparation of Specifications.

II. Details of Activity.

- A. The nature and scope of this activity cover the preparation of specifications for all types of equipment used for generation, transmission lines and distribution systems and the furnishing of any information needed for the purchase or installation and operation of the same by cooperatives or other divisions.
- B. This activity is the function of the Specifications and Drafting Unit of the Distribution Systems Section in collaboration with other units of the division.
- C. This activity was initiated to provide for the purchase of equipment items which will be of standard type and quality.
- D. Changes made are only those made necessary by expansion of experience gained in operation and relations with manufacturers.
- E. Experience gained by cooperatives has resulted in more detailed specifications to secure efficient operation.
- F. Applies to all cooperatives.
- G. Accomplishments have been the improvement of service conditions of many items and adaptability to standard assemblies.
- H. Should be continued and expanded as necessary to provide standards of performance for all equipment items and material.
- I. Provision should be made for closer check of field performance to assist in the preparation of specifications.

Activity 9

I. Representing REA on National Standardization and Safety Code Committees.

II. Details of Activity.

- A. The nature and scope of this activity are to serve as representative of REA on appropriate national standardization and safety code committees, such as those sponsored by ASA, AIEE, NESC, and to serve as consultant on the interpretation of the regulation of such bodies. This work consists of the preparation and presentation of all views and needs for the various standardization committees and the interpretation and advisory application of the rules and regulations of these committees as they apply to REA systems.
- B. Work of this nature is handled by the Distribution Systems Section in collaboration with the other sections of the Technical Standards Division.
- C. This activity was started to safeguard the interests of rural line construction in connection with any nationwide standards adopted and to be in position to negotiate modifications which might be desirable in the future.
- D. No changes except increase in activities and committee representation.
- E. Increase due to current revision of the National Electrical Safety Code and the Discussion thereof and membership in the Committee on Interpretation of the Code.
- F. Is of maximum benefit to all cooperatives.
- G. Accomplishments consist of changes in Code requirements permitting reduction in the cost of construction and operation of cooperative systems and the accumulation of considerable data for use in connection with the activities of other advisory or regulatory bodies.
- H. This activity is one which is very necessary as a protection to the property of the cooperatives and the safety of maintenance personnel. Interpretation of the requirements is compulsory in connection with all types of electrical construction.
- I. Extensions of this activity to include contacting State and other regulatory commissions would be desirable in connection with any new issues or revisions of present requirements, some of which could advantageously be relaxed.

Activity 8

I. REA Standardization Procedure.

II. Details of Activity.

- A. The nature of this activity is to supervise and coordinate the functioning of the established REA standardization procedure. The scope of this activity includes the preparation of detailed information on all items submitted to the Technical Standards Committees, preparation and distribution of the records of decisions of the committee, and the maintenance and distribution of the "List of Material Acceptable for Use on REA-Financed Systems."
- B. This is a function of the Equipment Performance and Specifications and Drafting Units of the Distribution Systems Section of the Technical Standards Division assisted by other units of the division.
- C. This service was formed to standardize the procedure for the approval of all equipment and material for use on REA rural substations, transmission lines and distribution systems.
- D. Committees are functioning as originally planned except for minor details or limitations imposed by lack of field data.
- E. Experience has only indicated the desirability of more complete information from the field on which to base approval or disapproval of equipment and methods.
- F. This service is of very material benefit to all cooperatives.
- G. Accomplishments have been the removal of several unsatisfactory items from the List of Acceptable Materials, changes in construction details, recommendations for improving service under special conditions and providing an impartial consideration of all proposals of manufacturers, REA engineers or cooperative personnel.
- H. Continuation of this service is necessary to provide for better service at lower cost.
- I. Standardization will probably be extended advantageously, but its work would be greatly facilitated if the assistance of the cooperatives could be stimulated to provide the information which is available in the great field laboratory but not yet coordinated in shape for the use of the committees.

Activity 9

- I. The supervision of the collection, analysis and evaluation of performance records.

II. Details of Activity.

- A. This activity covers the continued collection of information regarding the operation in the field of all substation, transmission and distribution equipment and material used on RRA systems in order to provide information to all interested in the construction or operation of the systems or in the preparation of specifications or manufacture of equipment therefor through prepared reports where required.
 - B. This activity is principally the function of the Equipment Performance Unit of the Distribution Systems Section of the Technical Standards Division in collaboration with other units of the division.
 - C. The activity was started to furnish information on the operating characteristics of all items of material and equipment to determine which items satisfactorily perform the required functions and which should be improved and how.
 - D. This was necessary because there was no background of experience on rural lines which could be relied upon to indicate the types of equipment most suitable for low cost lines which would give reliable service.
 - E. No changes except that work of the section has been increased as some items are required and experience has pointed out the defect in some.
 - F. Applies to all cooperatives but more work required for older cooperatives due to longer experience and original equipment, much of which has been changed on the recent projects.
 - G. Accomplishments include many improvements to service due to accumulated experience brought about by changes in specifications and advice to manufacturers leading to improvements in their products which have developed from the study of actual field results.
- III. This activity should be expanded to obtain more detailed information which will enable us to avoid the use of equipment or material which will not give the long time satisfactory service which must be obtained if RRA is to permanently supply cheap electricity. In order to obtain this information, it is necessary that the cooperatives be convinced of the necessity of furnishing the detailed reports of equipment failure which can only supply the basis for intelligent action. The present ten percent is not sufficient.
- IV. Closer contact of this unit or division with the cooperatives will no doubt serve to eliminate many troubles now thought to be unavoidable.

Activity 10

- I. Electrical and Mechanical Design and Development of Standard Equipment Arrangements.
- II. Details of Activity.
 - A. The nature of this activity is to direct the electrical and mechanical design and development of standard equipment arrangements for R.E.A. substations, transmission lines and distribution systems, and the development and maintenance of a construction handbook illustrating in detail all types of assemblies used on R.E.A. systems. The scope of this activity involves the preparation of designs for all types of substations, transmission lines and distribution systems as required to provide complete information to other divisions of R.E.A. and the various cooperative personnel on all types of construction assemblies required.
 - B. This activity is carried on by the Specifications and Drafting Unit of the Distribution Systems Section.
 - C. The activity was created to provide for standardized construction which would provide systems at the lowest possible cost of construction and operation.
 - D. The only change made has been the increase in scope due to extension of the R.E.L.I. program and the information gained in the operation of cooperatives.
 - E. Borrowers have requested assistance in solving such problems as vibration fatigue breaks of conductors; sleet, snow and bird troubles; equipment failures and many similar problems.
 - F. Activity is of major benefit to all cooperatives, but naturally the more recent ones have the advantage of experience gained by the earlier ones.
 - G. Accomplishments include the development of better construction at less cost due to standardization and improvements in materials, equipment and methods.
- III. In view of the above accomplishments and others anticipated for the future, it is recommended that this activity be continued and extended so that approved designs and specifications will be available as required to avoid costly mistakes due to lack of reliable information or experience.
- IV. Activity should be extended to cover all branches of R.E.A. construction and arrangements made to place the information in the hands of all concerned with the least possible delay by means of the proposed loose leaf construction handbooks or the equivalent.

Activity 11

I. Investigation concerned with features of rural electrical generation, transmission and substation facilities.

II. Details of Activity.

- A. The nature and scope of this activity are the initiation and conducting of investigations concerned with electrical, mechanical, hydraulic and structural features of rural electric generation, transmission and substation facilities and to translate the results of these investigations into appropriate recommendations for standardization.
 - B. The Power Section is responsible for this activity.
 - C. This activity was created to make recommendations as to the proper standard design of generation, transmission and substation facilities for loan-financed systems.
 - D. This activity has undergone little change since being first set up.
 - E. No change, except that the staff has been very much curtailed. Very little information has been furnished by the cooperatives.
 - F. Applies to all three categories.
 - G. This activity has not been fully developed in all its various phases. Some headway has been made in investigation of hydraulic, mechanical and electrical features of generation facilities. Manufacturers have been stimulated and are now working on new types of generating units to be used post-war in loan territory beyond the economic limit of line extensions.
- III. At the present time this activity is curtailed due to the lack of personnel, but it is felt that as soon as conditions permit, this activity will be continued with greater emphasis.
- IV. This activity will no doubt be changed and expanded as a complete investigation of the various facilities develop.

Activity 12

- V. Standardization of generation and transmission equipment, practices and procedures.

III. Details of activity.

- A. The nature and scope of this activity are to promote standardization of generation and transmission equipment, practices and procedures used on RGA systems, and submit items for standardization to the Technical Standards Committees. To investigate items submitted by manufacturers to make sure that all required data are submitted before the items go to the Committee.
- B. The Power Section is responsible for this activity.
- C. This activity was created to aid in the standardization of the above items concerned with transmission and generation to insure that the cooperative will be able to give the best possible service to its members.
- D. Little change has taken place in this activity since it was originally set up.
- E. No change.
- F. Applies to all three categories.
- G. Very few items now under study have yet reached standardization status.
- III. This activity has been curtailed by the lack of sufficient personnel and user conditions. As soon as circumstances permit, it is recommended that this activity be continued.
- IV. After the original function has been developed, many new activities concerned with it will be created to fully carry on the original function.

Activity 13

2. Studies of New Methods of Generation and Transmission.

II. Details of Activity.

- A. The nature and scope of the activity are to conduct studies of new methods of generation and transmission, such as, for example, the use of a gas turbine as a prime mover, the use of automatic hydro-electric and small electric power plants, and the use of high voltage, direct-current transmission, constant current a.c. transmission and other new methods, and to cooperate with equipment manufacturers and testing laboratories in the development of testing equipment required by such new methods.
- B. The Power Section is assigned this activity.
- C. This activity was created to study all new methods of generating and transmitting electricity which might be used advantageously on RRA systems with greater economy and better service.
- D. The objective of the activity has remained the same, although many changes have taken place in conducting the investigation of the various phases of the activity.
- E. Changes have been necessary as new conditions have arisen. As more information is gathered concerning a particular item, the method of studying it will change from time to time.
- F. Applies equally to all three parts.
- G. These studies have resulted in the study of different methods of generation and transmission of electricity in rural areas. Among other phases of this activity, the study of "little later" sites and gas turbines have been developed and investigated.
- III. This activity should be continued, although it has been greatly curtailed due to the lack of personnel. Great possibilities lie in the discovery of the use of new methods of generation such as the gas turbine, hydro-electric power developments, and application of direct-current transmission and other methods.
- IV. This activity should be expanded in the future. As RRA extends into less populated areas, isolated automatic generating units will become necessary as well as the solution of resulting problems in transmission.

Activity 14

X. Research on Problems of Power Generation and Transmission.

II. Details of Activity.

- A. The nature and scope of this activity are to stimulate research on problems of power generation and transmission by equipment manufacturers and established research centers.
 - B. The Power Section is responsible for this activity.
 - C. This activity was created because the research facilities within RWA are limited, and it is felt that the available research facilities of the country should be used instead of creating duplicate facilities. Manufacturers of transmission and generation equipment as well as other research establishments prepared to solve problems of generation and transmission are the logical places where RWA can obtain solutions to many such problems.
 - D. The general objective of this activity has experienced little change. Methods of having certain problems solved have changed from time to time.
 - E. Reasons for most changes arise with new methods of solutions being applied to various problems.
 - F. Applies to all three categories.
 - G. Solution of problems which have resulted from RWA stimulus by various equipment manufacturers and research centers have resulted in better service on rural line systems.
- III. At the present time this activity has been curtailed by lack of personnel and war conditions. As soon as circumstances permit, this activity should be continued. It is essential that RWA have access to the latest information on all new methods being employed to solve various problems of generation and transmission.
- IV. As this activity is carried on in the future, there will be many changes necessary caused by new methods being developed by equipment manufacturers and research centers.

Activity 15

I. Preparation of Standard Specifications for Generation and Transmission Equipment.

II. Details of activity.

- A. The nature and scope of this activity are to assist, and where necessary, to prepare standard specifications for generation and transmission equipment and to serve as consultant in the preparation of contracts for the purchase of such equipment.
 - B. This activity is assigned to the Power Section.
 - C. This activity was created to assist in drawing up specifications for generating and transmission equipment which would meet requirements of rural line conditions and be in accordance with national standards.
 - D. There has been little change in the activity since it was originally created.
 - E. No change.
 - F. Applies to all three categories.
 - G. This activity has not been developed fully, although much consulting service has been rendered on matters pertaining to generation and transmission equipment specifications to other Divisions in REA.
- III. This activity has been curtailed due to lack of personnel. It is felt that this activity should be continued when circumstances permit insofar as the aid rendered will be of value to PEs.
 - IV. There is little doubt that if this activity is continued, new functions will be necessarily created to adequately cover the objectives of the original activity.

Activity 16

X. Engineering Studies and Consulting Activities of Generation and Transmission Systems.

III. Details of Activity.

- A. The nature and scope of this activity are to carry out engineering studies of operating problems relating to maintenance, design and planning of generation and transmission systems by securing, accumulating and analyzing data from the field.
 - B. This activity is assigned to the Power Section.
 - C. This activity was created to assist in the solution of problems relating to generation and transmission systems and to plan these systems to give the best service possible.
 - D. Little change has taken place in this activity since it was originally established.
 - E. No change.
 - F. Applies to all three categories.
 - G. This activity has been largely confined to consulting services to other Divisions of REA. Engineering studies of specific problems referred to this section have been made, often resulting in better generation and transmission service.
- III. At the present time this activity has been curtailed by lack of personnel. As soon as conditions permit, it is recommended that this activity be continued.
- IV. There are no new activities which can be carried on in connection with the function at this time; however, as the function is continued, new activities will arise.

Activity 17

- I. Studies of Load Condition Effects.
- II. Details of Activity.
 - A. The nature and scope of this activity are the supervision of studies of load condition effects on the costs of generation, transmission and distribution of electrical energy.
 - B. This activity is assigned to the Power Section.
 - C. After systems became operative, problems relating to load condition effects on the costs of generation, transmission and distribution now could be studied and the solution of these problems are applied to future projects.
 - D. This activity has undergone little change since it was originally established.
 - E. No change.
 - F. Applies to all categories although the study of load conditions to the older established cooperatives is applied to the new borrowers.
 - G. Load condition studies have been made on a number of representative cooperatives and the results of these studies formulated in a Technical Standards Bulletin, as yet incomplete.
- III. This activity, although greatly curtailed by lack of personnel, should be continued, as it will be of much value in the study of future projects.
- IV. At the present time there is no staff to carry on new activities in connection with this function. In the future, however, the interpretation of the results of this activity as they are applied to new systems being organized will of necessity create many changes in the original activity.

Activity 18

I. Investigation of Misutilized Generation and Transmission Facilities.

II. Details of Activity.

- A. The nature and scope of this activity are to investigate existing REA generation and transmission facilities and to make appropriate recommendations for their improvement in the interest of increased efficiency.
 - B. This activity is assigned to the Power Section.
 - C. This activity was created as the need for greater efficiency and changes in existing generation and transmission facilities became apparent. It is important that REA power houses and substations be improved all the time and always kept up-to-date.
 - D. Little change has taken place in the original activity since it was established.
 - E. No change.
 - F. Applies mainly to existing borrowers.
 - G. Many recommendations have been made relating to the improvement of generation and transmission facilities as these problems have been referred to the Power Section.
- III. This activity has been curtailed due to the lack of personnel. It is recommended, however, that this activity be continued and expanded when conditions permit.
- IV. As this activity has not been definitely crystallized, it is apparent that many changes and new activities will be created if this function is carried out fully.

Activity 19

I. Preparation of Technical Standards Bulletins.

II. Details of activity.

- A. The nature and scope of this activity are to supervise the preparation and editing of Technical Standards Bulletins.
 - B. This activity is assigned to the Power Section.
 - C. The need of technical papers resulting from studies carried on by the Division necessitated the establishment of a committee to supervise the preparation of these papers in the form of Technical Standards Bulletins. This responsibility was assigned to the Power Section.
 - D. This activity has continued essentially as it was originally set up.
 - E. Revisions and supplements are often made which require some changes in the ordinary procedure of editing the bulletins.
 - F. Applies to all three categories.
 - G. As a result of this activity, nine Technical Standards Bulletins have been finished and distributed. Several more are being prepared.
- III. This activity should be continued, as these bulletins have proven to be of great value to technicians and engineers both within and outside of REA.
 - IV. There are no new activities which are being carried on at the present time in connection with this activity.

- I. Investigation of Engineering Research Facilities.
- II. Details of Activity.
 - A. The nature and scope of this activity are to investigate existing research facilities in governmental agencies, universities and other established research centers; assemble information and make recommendations regarding those best equipped to pursue research studies and equipped for testing purposes on both agricultural phases of electrical devices for use on farms and in farm industry, and equipment necessary for supplying electric service to REA consumers.
 - B. This activity is carried on by the Special Problems Section, Technical Standards Division.
 - C. This activity was started to locate institutions having adequate facilities and technical personnel for:
 - (1) Carrying on research studies for REA on technical problems for which no laboratory and recording equipment is provided.
 - (2) Testing of electric farm and home equipment in developmental stages and also rural line equipment for the borrowers such as transformer oil, rubber gloves, and others.
 - D. Outside of an initial partial survey, little has been done on this activity as at no time have funds been available to negotiate with institutions to do this work. Personnel has also been lacking to make and maintain the necessary contacts.
 - E. Lack of personnel and funds did not permit prosecuting this activity in a manner to make the most out of it.
 - F. There are no differences in scope and detail, as it involves new and existing borrowers, as all would be benefited by this activity.
 - G. Research and tests of farm freezer and storage chests, the household flour and cereal mill, and electric household dehydrators have been conducted for REA by the Division of Housing and Household Equipment, Bureau of Human Nutrition and Home Economics, USDA. Personnel and supplies were furnished by REA for this purpose. Much help was furnished by the National Bureau of Standards, U. S. Department of Commerce; Boyce-Thompson Institute of Plant Research; state colleges of agriculture and others.
- III. This activity should be continued and needs to be expanded as the demands of borrowers increase for electric farm and home equipment as soon as materials become available for their manufacture. For many examples see the monthly progress reports.
- IV. Many of the research institutions, both public and private, are especially well qualified in both personnel and physical facilities to carry on specific research in electric farm and home equipment for REA. In numerous cases this could be expedited if REA had a small budget available to pay at least in part for such services.

Activity 21

I. Promote the standardization of electric farm equipment.

II. Details of Activity.

- A. The nature and scope of the activity are to prepare functional specifications for electric farm equipment to meet the requirements of REA consumers. These are based upon research results obtained from experiments conducted by the Department, state experiment stations, state agricultural colleges, and other public and private institutions. The assembled data are furnished manufacturers upon request, who are interested in the development and manufacture for such equipment.
- B. This activity is carried on by the Special Problems Section, Technical Standards Division.
- C. This activity was created in order to provide manufacturers, requesting it, with authentic and basic information on electric farm equipment. By standardizing, it is possible for REA to guide manufacturers in producing quality equipment suited to the needs of its members at the lowest possible cost. Competent specialists have been assigned to this task.
- D. Many changes have taken place in the performance of this activity due to experiences gained, to allow for the lack of, and substitution of, materials, and reduced personnel made necessary because of the war.
- E. Research results, experience gained in the field, and material substitutions require constant changes in the standards which should insure the quality of the electric farm equipment made available to REA members.
- F. There are no differences as it applies to new and existing borrowers.
- G. Functional specifications have been prepared and accepted by Technical Standards Committee "A" on farm freezers, household dehydrators and household flour and cereal mill. Manufacturers have been supplied with these as well as research data on numerous other electric devices and have spent thousands of dollars in their development. Standardization of electric chick and pig brooders is proposed, and a report has been prepared based upon replies from all state agricultural colleges doing research in this field.
- III. This activity should be continued and intensified as manufacturers are ready to develop electric farm equipment and materials are again available for manufacturing purposes. See "Monthly Progress Reports" for details.
- IV. Standards have been prepared for only a few items. The same should be done for many others and made available to other Divisions, thus providing the borrowers with quality equipment and safeguarding REA loans. This is a continuous function requiring constant revision and additional standards because of new developments.

July 24

I. Stimulating the Development of Electrical Devices.

II. Details of Activity.

A. The nature and scope of this activity are to stimulate the development of electrical devices by manufacturers, government agencies, universities, and other research organizations and contact manufacturers for the purpose of securing rapid quantity production. Information as to what electric farm and home equipment is needed is secured from Cooperative managers, farmers, rural electrification specialists, and other sources. The development and production of this is discussed with manufacturers, universities, and other interested parties. Needs, benefits and opportunities are presented. A list of electric applications has been prepared for dissemination.

B. This activity is carried on by the Special Problems Section, Technical Standards Division.

C. This activity was started for the purpose of making available quality electric farm and home equipment at low cost to REA members. Requests for such equipment in quantity come from both borrowers who are anxious to secure the benefits of it through better living, higher incomes, reduced labor and manufacturers, seeking technical advice, who are constantly inquiring: "What electric equipment can we manufacture in quantity of value to REA consumers?"

D. No routine procedure can be set up for this activity because of the wide scope of electric applications and the great variety of inquiries received. As far as possible, authentic data are assembled on individual items and used to answer requests.

E. No changes have been made.

F. There are no differences in scope and detail as it pertains to both new and existing borrowers.

G. Because of this stimulation manufacturers have spent considerable sums of money in developing experimental models and are ready to go into quantity production as soon as materials are again available. Equipment so developed is being tested in governmental, commercial and private laboratories.

III. This activity should be continued, as through it farm freezers, household dehydrators, electric household flour mills have been developed for use by REA members as soon as they can be produced. There are many other items which should be developed. Greater emphasis should be placed on this activity so as to have needed equipment developed for quantity production as soon as the war is over. For further details, see the files and Monthly Progress Reports.

IV. Many electric farm and household appliances, such as egg cooler, milk pasteurizer, garden irrigation equipment, dairy barn ventilator, soil sterilizer, electric fence and others, need to be developed and homemade ones redesigned for quantity production before they will be universally accepted by the farmers of the Nation. This work needs to be done to supply the demands of REA borrowers.

I. Investigations Dealing with Electro-Agriculture.

II. Details of Activity:

- A. The nature and scope of this activity are to maintain constant contact with research institutions and keep accurate records on the progress of all investigations dealing with electro-agriculture. Study, investigate and develop new electrical accessories and devices for use by consumers served by REA systems for the improvement of crops, livestock, home equipment and the processing of farm products, both for improving the health of, and the environment of, the farmer, and for increasing the revenue. Establish liaison channels with Bureau of the Department. Research institutions such as the Department, State Agricultural Colleges, private and others are to be visited from time to time to secure reports of all investigations carried on dealing with electro-agriculture. These are compiled, studied and summarized, and thus serve as the basis for the development of new or redesigned electric farm and home equipment meeting the needs of REA consumers.
- B. This activity is carried on by the Special Problems Section, Technical Standards Division.
- C. This activity enables the cataloging of research on electro-agriculture at all institutions. It provides an immediate reference as to what institutions are doing work by subjects and the progress they have made with each. The research information thus accumulated will serve as a source of ready reference for consulting purposes to other Divisions and subsequently to members, and for the development of electric equipment by manufacturers.
- D. No changes have taken place in the performance of this activity since its inception.
- E. No changes have been made.
- F. There are no differences in scope and detail as it involves new and existing borrowers. It applies to all the same way.
- G. By knowing research sources and the extent of it by individual institutions, it is possible to answer technical inquiries from other Divisions and subsequently borrowers and members on the application of electricity to agriculture. It also provides a shelf of information for the development of electro-agricultural equipment to manufacturers requesting it.
- H. This activity should be continued. In fact, it should be expanded. Because of lack of personnel and funds, it has been impossible to visit research institutions as often as necessary to keep up-to-date on their investigations. This research data furnished the foundation for functional specifications and the development of the farm freezer and storage cabinet, electric household dehydrator, and household flour and cereal mills. For details of numerous other items see the files and Monthly Progress Reports. These same data were also used on numerous occasions in reply to inquiries from other Divisions, manufacturers and others.
- I. This is a continuous function, as new information is unearthed by research at all times. All such research data should be assembled and applied as it becomes available, so as to be of immediate benefit to REA electrified farms.

Activity 24

I. Technical Studies of Electro-Agricultural Equipment.

II. Details of Activity.

- A. The nature and scope of this activity are to make technical studies of electro-agricultural equipment which do not fall specifically within the functional scope of other sections in the Technical Standards Division. This activity involves special problems requiring investigation as to their practical application to agriculture. As a rule each project or invention is of an unusual nature and originally was sent by the individual or inventor to a high government official and then referred to REA for reply.
 - B. This activity is carried on by the Special Problems Section, Technical Standards Division.
 - C. Problems of this nature are referred by REA to this Section because of the training and experience of the personnel.
 - D. No changes have taken place in the performance of this activity as no two problems are identical and all require different treatment. As all are highly technical, a knowledge of sources of information is essential to determine their value.
 - E. No changes have been made.
 - F. There are no differences in scope and detail as it involves new and existing borrowers.
 - G. Investigations include such items as electric field weed killer and soil sterilizer, Avon tree rod, livestock electrocution, electric flour and cereal mill, electric tractor, electric plow, electric rodent exterminator, and others. All of those submitted warrant investigating, for from these will come worthwhile and practical electric farm and home equipment.
- III. This activity should be continued, thus giving REA the opportunity to see and investigate new ideas, schemes and inventions relating to electro-agriculture, and assist with the development of those benefiting REA members. For details on various items see the files and Monthly Progress Reports.
- IV. Items under investigation now are Avon tree rod, electric rodent exterminator and electric tractor designed for circular farming. New activities for the future are unpredictable.

Activity 25

- I. Participation in the activities of national bodies, associations or committees concerned with electrical equipment standards, test procedures and codes.
- II. Details of Activity.
 - A. Nature and scope of activities under this function are to participate as members in the various national bodies, associations and code committees in the formulation of standards for materials and equipment used on borrowers' systems, the establishment of test procedures, and improved methods for installation of materials and equipment.
 - B. The above activities are carried on by members of the Consumers Service Section in collaboration with other sections of the Technical Standards Division.
 - C. These activities were started because it became evident some years ago that special conditions affecting the borrowers' systems made it imperative that their problems should have due consideration when new standards, procedures or codes were being considered.
 - D. These activities have been continued and expanded due to the recognition, by national bodies of committees, of the need of having a representative for REA borrowers on their committees.
 - E. None.
 - F. These activities are the same for all three classes of borrowers.
 - G. Many changes have been made by the National Electrical Safety Code to improve construction standards for rural distribution systems as a result of our participation in these activities.
- III. These activities should be continued and expanded so that the borrowers' problems will be taken into consideration when codes or standards are being formulated which will affect the economical operation of their systems.
- IV. None.

Activity 26

- I. Preparation of specifications for electrical equipment to be purchased by borrowers under the Group Purchase Plan, and consulting service in the preparation of "Call for Offers," "Offer Forms," etc.

II. Details of Activity.

- A. The nature and scope of activities under this function are to formulate and prepare functional, mechanical and electrical specifications for materials and equipment to be purchased by borrowers under the Group Purchase Plan; to serve as consultant in the preparation of "Call for Offers to Sell," "Offer Forms," etc.; to check and analyze "Offers to Sell" received from manufacturers for compliance with specifications; and to tabulate "Offers to Sell" for the Group Purchase Committee.
- B. The above activities are performed by the Testing and Metering Unit of the Consumers Service Section.
- C. These activities were started when the Group Purchase Plan was adopted to insure that the equipment purchased under this plan by borrowers would be of acceptable quality and most adaptable to their needs.
- D. There have been no changes in these activities since they were started.
- E. See "D" above.
- F. The activities of this function are the same for all three classes of borrowers.
- G. The accomplishments under this function are the standardization of equipment used by borrowers and the development of new equipment designed expressly for the borrower's needs, such as watt-hour meters, improved service equipment, meter test kits, electrical instruments, ground testing equipment, etc.
- III. The activities of this function should be continued in the future to enable the borrowers to obtain better materials and improved equipment designed to meet their needs at a substantial saving in overall cost. It is estimated that these activities have been in a large part responsible for savings in the cost of equipment purchased by the borrowers under this plan of approximately \$1,500,000.
- IV. The activities under this function should be expanded to include more extensive surveys of equipment performance on RFA systems so as to further the development of new equipment more suitable for the needs of the borrowers.

Activity 27

I. Engineering recommendations to other divisions on problems of operation affected by the characteristics of materials and equipment.

II. Details of Activity.

- A. The nature and scope of the activities under this function are to make engineering recommendations to other divisions and subsequently to borrowers regarding the selection and operation of equipment used by REA borrowers, such as Line Protective Devices, Sectionalizing Devices, Transformers, Metering Equipment, Motors and Motor Controls, Industrial Applications, etc.; to prepare replies to all special technical inquiries received by the Cooperatives' Operations Division from borrowers relating to engineering problems.
- B. The above activities are carried on by the Consumers Service Section.
- C. These activities were created in order to provide consulting engineering service to Regional Engineers and borrowers on problems which require special studies by engineers specifically trained in highly specialized branches of engineering as related to rural electrification.
- D. The work and the variation of subjects covered have increased with the energization of new systems and the addition of many specialized rural industrial loads on existing systems.
- E. The necessity of individual recommendations on some equipment has been eliminated because surveys of borrowers experience with this equipment have made it possible to formulate general recommendations to all borrowers in the form of Operations Memoranda.
- F. These activities are the same for all three classes of borrowers.
- G. The accomplishments of these activities are that every request for consulting services has been complied with promptly regardless of the wide scope of problems

Activity 27 (Cont'd)

submitted. For examples, refer to the Monthly Progress Report of the Consumers Service Section.

- III. The activities under this function should be continued and expanded so that the borrowers may obtain the benefits of expert advice in the selection and operation of materials and equipment.
- IV. The scope of activities under this assigned function is necessarily wide and the number of subjects covered will vary with the needs of the borrower.

Activity 28

I. Supervise the testing, design and performance characteristics of commercially available electrical equipment.

II. Details of Activity.

- A. The nature and scope of activities under this function are to supervise the testing of design and performance characteristics of electrical equipment such as Transformers, Lightning Arresters, Sectionalizing Devices, Electrical Instruments, Service Entrance Equipment, etc.; and to make appropriate arrangements for such tests by governmental, educational or commercial testing laboratories.
- B. The above activities are carried on by the Testing and Metering Unit of the Consumers Service Section.
- C. These activities were started because of the need of borrowers for assurance that the equipment listed under the "List of Acceptable Materials," or purchased under the Group Purchase Plan, are up to the standards and specifications guaranteed by the manufacturer; also because of the borrowers' need for facilities to test items of equipment which have failed on their systems to determine whether or not failure was due to defects in the equipment. Such tests are necessary so that engineering recommendations can be made for the improvement in the specific equipment in question.
- D. None.
- E. None.
- F. These activities are the same for all three classes of borrowers.
- G. We have been able, through these activities, to make tests or arrange to have tests made on all equipment submitted by manufacturers or borrowers.

III. These activities should be continued because these tests prevent inferior equipment insofar as possible from being sold to the borrower, and the testing of defective equipment sent in by borrowers often shows the way for improving the design to reduce the number of failures. Examples, such as the rejection of equipment on the basis of test reports, may be found in the Monthly Progress Report.

IV. None.

Activity 29

I. Engineering computations and studies of rural power systems.

II. Details of Activity.

- A. The nature and scope of the activity are to make engineering computations and studies of operating problems as related to rural power systems such as Voltage Regulation, System Stability, Coordination of Protective Devices, and to make appropriate recommendations for the solution of system problems; to develop new engineering methods for rural circuits.
- B. The above activity is carried on by the Operating Problems Unit of the Consumers Service Section.
- C. This activity was created to simplify engineering methods and procedures in order to assist borrowers in improving the quality of service rendered to members at the lowest possible costs and to have one very competent specialist do this work instead of several people doing it amateurishly.
- D. Many changes have been made in conducting this activity, due to the procedure being crystallized. The operation of rural power lines under wartime conditions has made it necessary to tolerate certain changes because of reduced personnel and the unavailability of materials.
- E. After definite procedures have been established and distributed to appropriate divisions, and subsequently to project managers and engineers, the latter are enabled to carry on such technical work with less assistance from the REA staff. Small improvements are continually made based on experience received from the cooperatives. As time goes on, however, the accumulation of small changes often necessitates drastic changes to be made in the original procedure.
- F. Applies to all three categories.
- G. The development of uniform methods of rural power line operation has aided the local personnel to successfully operate their projects. The cases in which troubles have been eliminated and unusual problems solved are innumerable to list. In all these instances service has been improved and interruptions reduced.

Activity 29 (Cont'd)

- III. This creative activity incorporated with improved engineering methods and procedures for operating rural distribution lines should be continued. For examples refer to the Monthly Progress Reports.
- IV. The activity outlined under Item II is a continuous function, as it is essential that new and improved methods and procedures should be made available to other divisions and subsequently to the borrowers.

Activity 30

- I. Inductive Coordination Problems.
- II. Details of Activity.
 - A. The nature and scope of this activity are to organize, direct and supervise a study of mutual effects between adjacent power and communication facilities, and the installation of communication and signaling systems which are physically connected to the power system; to supervise the maintenance and use of the inductive coordination truck.
 - B. This activity is carried on by the Consumers Service Section in collaboration with other REA divisions affected, and other foreign wire users.
 - C. This activity was created to avoid insofar as possible any litigation involving communication companies and the borrowers and to coordinate rural power lines with communication systems. Also to assist borrowers in lawsuit and State Commission hearings on inductive coordination problems.
 - D. There have been no major changes taking place in the performance of this activity since its creation in 1937. Many interference problems which have appeared during the war period have been placed in a deferred coordination file to be taken care of if and when the interference problem becomes intolerable or after the war is ended.
 - E. This type of work is very highly specialized and there are very few engineers available who are trained specifically for it. The borrowers gain very little experience in conducting this activity because interference cases are not a day-to-day problem.
 - F. The scope of this activity applies to borrowers of all categories.
 - G. The accomplishments of this activity have reduced to a minimum the number of lawsuits and have also been instrumental in obtaining favorable State Commission regulations. It is impossible to evaluate the worth of this activity in that it has tremendous influence in more friendly relations between the borrowers and other foreign wire users. It makes it possible for the cooperative members to enjoy both services.

Activity 30 (Cont'd)

- III. This activity should be continued and intensified. It is recommended that an additional engineer be assigned to this work as various State Commissions are now devoting considerable time in creating and revising inductive coordination regulations that will affect the economics of the rural electric systems.
- IV. This is a continuous activity and should be continued in accordance with established policy and procedures.

Activity 31

I. Technical Investigations - Laboratory and Field Tests.

II. Details of Activity.

- A. The nature and scope of the activity are to organize and direct such laboratory and field tests as may be required in the study of technical operating problems, and to supervise the maintenance and use of the mobile laboratory.
 - B. This activity is carried on by the Consumers Service Section.
 - C. This activity was created to gather such basic data as are found to be necessary to improve and simplify engineering methods and procedures in the operation of rural distribution power lines. Many of the technical investigation problems are fundamental in nature, such as obtaining basic data on recent load conditions of operating projects.
 - D. There have been no changes in the performance of these activities with the exception of decreased technical personnel which prolongs the carrying out of the work. Each individual technical investigation problem is individualistic and is so organized to attain a certain objective.
 - E. Because of the nature of loads being served, the inactivity of line extensions, increased usage and many other factors, the operation of rural power lines under wartime conditions presents a changing operating problem.
 - F. The scope of this activity applies to the status of all borrowers.
 - G. A running record of these accomplishments may be found in the Monthly Progress Reports for the division.
- III. Because of the many unknown factors involved in the operation of rural power lines and the interest now shown in post-war planning, it is strongly recommended that this activity be intensified so that in an expanding program after the war, engineers will have sufficient basic data to make proper designs of future systems and extensions. In addition, more assistance can be given to borrowers in operating their systems with a reduced staff. There has been considerable correspondence from borrowers indicating much enthusiasm and desire to have this activity proceed because of the tremendous assistance which they received from it.

Activity 31 (Cont'd)

- IV. The activity under Item II is a continuous function as it is essential to have basic and fundamental data available to other divisions and subsequently to the borrowers for the proper operation of their operating systems.

Activity 32

- I. A Standardization of All Operating Equipment, Practices and Procedures.
- II. Details of Activity.
 - A. The nature and scope of this activity are to promote and encourage the standardization of all equipment, practices and procedures affecting the technical operation of REA systems.
 - B. The above activity is carried on by the Consumers Service Section in collaboration with the Cooperatives' Operations Division.
 - C. This activity was created to assist the Cooperatives' Operations Division in the technical aspects of rural power systems.
 - D. The only changes which have taken place in the performance of this activity are the benefit of the operating experiences of the operating systems. Insufficient engineering assistance at the present time has made it difficult to properly carry on the work.
 - E. See Item D.
 - F. This activity applies to borrowers in all categories.
 - G. This activity is continually bringing to the attention of the borrowers more economical methods in the use of equipment to improve the quality of service to consumers at reduced operating and maintenance cost with fewer personnel.
- III. In view of the fact that there are numerous unforeseen operating problems which arise from day to day, it is obvious that this work should be continued and intensified. Some of the problems include such items as permissible transformer overloads, lightning protection, grounding, etc.
- IV. As outlined under Item II, it is very difficult to anticipate many unforeseen functions assigned which should be performed now or in the future.

APPENDIX

History
of
the Technical Standards Division

1. How did it come about?
2. What has it been accomplishing?
3. What does it hope to do in the future?

THE TECHNICAL STANDARDS DIVISION

In accordance with the Administrator's general order, the Technical Standards Division has three distinct functions.

1. Of consulting engineering service to other divisions of REA, to the cooperatives and to anyone else that the Administrator may refer to the Division.
2. Of technical standardization for REA and the cooperatives throughout the country.
3. Of new developments for rural electrification.

1. HOW DID IT COME ABOUT?

In order to give you a picture of the activities of the Technical Standards Division, which is a rather unusual organization in government or private business, it is necessary to give you a little background history. When Mr. Winder took over Operations, the then existing Division of Operations Supervision only had three or four engineers. When the Operations Division was first set up, it was thought that engineering was not necessary for Operations Supervision. It was found out that engineering was very important in Operations Supervision, and Mr. Winder started organizing an engineering staff for supervising the operations of the projects. The present chief of the Technical Standards Division was made Chief, Operations Engineering.

It had been found before that no foundation of engineering as yet existed for rural electrification. It was necessary to use the experiences of the various utilities as precedents and guides for our designs.

As brought out principally by Morris Cooke, a number of years ago, the engineering profession had paid little attention to distribution engineering. Practically all engineering activities were devoted to generation and transmission. There being no distribution engineering to speak of, there could not have been any rural electrification engineering to speak of. So we started from scratch, and we went about creating a rural electrification engineering. Even now only one or two chapters of this branch of engineering is in existence, both of these chapters created by the staff of the present Technical Standards Division in cooperation with the staffs of other divisions.

The work grew slowly to enormous proportions, and when it was found necessary to combine the various engineering activities under Mr. Winder, there was created a Research Engineering Section headed by the Present Chief of the Technical Standards Division. It functioned for a considerable time as a section and was then promoted to a division known as the Technical Standards Division.

The mobile power houses were originated by the Technical Standards Division. In addition to the great service they have been rendering REA projects in distress, they rendered an outstanding service for the war. Even before Pearl Harbor the British purchased hundreds of units in this country, first on trailers, later on skids, and they skidded them all over Egypt. The American manufacturers were ready because the REA Technical Standards Division prepared them. Later on our own Army and Navy bought hundreds and perhaps thousands of them, and recently hundred are being sent to Russia. The few that we bought are rendering service, two of them to the Army in Alaska.

We prepared standards, at the request of the Army, for electric distribution systems in Army camps, using our own standards as a guide. We prepared standard designs for high voltage line construction for the Army. The Army is using all these. We worked out carrier communication system for the Marines. We assisted the U. S. Forestry Service and the U. S. Weather Bureau with radio problems. Numerous other items of a confidential nature cannot be mentioned here. Perhaps the most important contribution of the division is represented by the number of commissioned officers from the division now rendering outstanding service to the armed forces based on the experience they had here: eight commissioned officers in the Navy, seven in the Signal Corps, three in the Marines and two in the Air Corps.

There are numerous other items that we invented, created and developed and turned over to other divisions. Mention may be made of the delinquent accounts study which received such fine recognition throughout the country and the establishment of balance sheets for all projects which showed the country that REA projects are paying out. Both of these activities and numerous others were initiated by the staff of the present Technical Standards Division. We also prepared the first comprehensive wholesale rate report which served as a foundation for rate reductions to REA projects throughout the country.

In the field of engineering, we wrote the first chapter of what is now known as rural electrification engineering. It is Technical Standards Bulletin No. 4 now used as a text book by all engineers in the United States and all the schools. It is a fundamental engineering presentation of how to establish the proper protection on REA lines against short circuits and on how to coordinate these various protective devices so that when a short circuit occurs in one place it will not put the whole system out of commission.

We have computed in this office the short circuit coordination for close to 300 projects, something that no one in the history of engineering ever did before, and we have developed it to such perfection that we are almost relieved of the burden of doing anything more along this line because now project engineers can do it.

We are responsible for the reduction in the price of a sectionalizing breaker from \$120.00 to \$89.00, and of inducing manufacturers to make breakers. There was only one manufacturer before.

We have engaged in a study of the numerous problems of voltage regulation which are becoming more difficult due to the additions of numerous war industries on the system. We have participated in the computation of the characteristics of high voltage lines that REA built for war purposes. We have been rendering the projects continuous service relating to meters and service installations. We are now rendering the Industrial Power Section of the Design and Construction Division continuous consulting service in connection with all service installations. Practically every case is referred to us for some engineering advice.

The number of questions referred to the Technical Standards Division for consultation is almost infinite. The administrator's instructions that we are to render service to everyone and anyone on anything at all seems almost impossible, and yet we have never turned anyone down. We don't know how we did it, but we did it.

We are preparing the ground for elaborate tests on grounds, and when we get through, we will know something about grounds. No one knows much about it now.

In the field of standardizations, we established the Technical Standards Committees in which the Technical Standards Division, the Design and Construction Division, the Cooperatives' Operations Division and the Applications and Loans Division all participate. There was a time when there was a continuous line of complainants knocking at the Administrator's door and complaining because they thought that one of their constituents who tried to sell REA some piece of junk was discriminated against. All this is now stopped. The reputation of the Technical Standards Committee is so high now, that it is almost equal to that of the Bureau of Standards, and its decisions are accepted by everyone because the procedure is so that incompetence and dishonesty are almost impossible. There have been numerous rejections by the Committees, but there hasn't been a single complaint. We consider this the outstanding accomplishment of the Technical Standards Division.

Along the line of new developments, we may say that we have no research facilities of our own, nor have we anyone devoting his full time to the development of new devices. The principle that we established that we don't need such facilities, that all we need is to show the manufacturers the need for a new device and the manufacturers spend the money in developing it because they realize the enormous purchase capacity of REA projects.

Thus we have succeeded in breaking the meter monopoly and reducing the price of meters by .20.00 apiece. We are succeeding in giving the farmers, not as a part of their house wiring, but of the line construction the complete service equipment with circuit breakers instead of fuses, much finer installation than anyone of you have in the city.

We developed a new ground meter, and new demand meters and a great many other things that the rural cooperatives need but that did not exist before.

In the field of telephone coordination, we have done a bigger and better job than any other utility had before as is testified by the large telephone companies. We worked in cooperation with the telephone companies and the office of the Associate Solicitor who advised that since the boys of the Technical Standards Division have been active in this field, they practically had no lawsuits. They had many lawsuits before.

We have developed a carrier signal system which makes it possible to know at headquarters at once when a sectionalizing fuse blows or a sectionalizing breaker opens and also when service is restored. The superintendent can communicate with linemen by means of this carrier. The work stopped due to war. As soon as released, all projects will be able to purchase this equipment.

In cooperation with A.T. & T., we developed a system of giving an electrified farm commercial telephone service over the power lines without telephone wires, regular dial telephones, for short and long distance telephoning. This is stopped due to war. As soon as released, experimental installations will be immediately possible.

We initiated the investigation of little waters with a view in mind that some day small water powers that may exist near the projects will all be developed for the benefit of the farmers. A study is now under way with the cooperation of the Federal Power Commission and our own Applications and Loans Division, and a technical bulletin on the subject is almost ready.

In the field of "electro-agriculture," an expression created by us, we are also on the way to creating a branch of engineering that did not exist before, as is evidenced by a paper in the October issue of "Electrical Engineering," the official organ of the American Institute of Electrical Engineers. We have been unusually successful in inducing manufacturers to spend considerable sums of money on the development of new electro-agricultural equipment to increase food production and preservation on the electrified farm and to increase the farmer's income by the use of electric service. Many such items will be on the market as soon as critical material is available. We have created the beginning of a new engineering known as electro-agricultural engineering and have been told by manufacturers that we are entitled to all the credit for the creation of a new industry, known as: Electro-agricultural industry.

We are proud of having been able to stimulate and promote the activities of young engineers who have now left us and are rendering such fine service to the armed forces of the country. We venture to say that there is no organization in or out of the government which in a very short time has developed so many original thoughts, devices and inventions by young engineers.

We have lost to the armed forces most of our young engineers, and each one of them had invented something or had published an important technical paper. Many of these have been published in national magazines, or delivered before Technical Societies. Based on this, every one of the boys now has an important, individual, confidential assignment in the Army, Navy or Marine Corps. Lost of them are gone.

That we are going to do without them and how we are going to continue this work is not ours to decide.

We will be forgiven if we say that we are proud of the spirit existing in the Technical Standards Division. The Administrator complimented us highly on the high spirit of cooperation and the fine family spirit within the Division. There has never been one single complaint by one member of the Division against another, something very unusual in private as well as government business. This applies not only to the engineers of the Division but also to the fine girls we have.

